Design Element				Manual Section	Design Value (By Type of Area)		
					Suburban	Intermediate	Built-Up
Design Controls	Design Forecast Period			40-2.02	20 Years	20 Years	20 Years
	Design Speed (mph) (1)			40-3.0	Curbed: 45-55 Uncurbed: 50-60	Curbed: 40-50 Uncurbed: 50-60	Curbed: 30-35
	Access Control			40-5.0	Partial Control / None	None	None
	Level of Service			40-2.0	Des: B; Min: C	Des: C; Min: D	Des: C; Min: D
	On-Street Parking			45-1.04	None	Optional (2)	Optional (2)
Cross Section Elements	Travel Lane	*Width (3)		45-1.01	Curbed: 12 ft Uncurbed: 12 ft	Curbed: Des.: 12 ft; Min.: 11 ft Uncurbed: Des.: 12 ft; Min.: 11 ft	Curbed: Des.: 12 ft; Min.: 10 ft
		Typical Surface Type (4)		Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
	*Curb Offset (5)			45-1.02	2 ft	2 ft	2 ft
	Shoulder	*Paved Width (6)		45-1.02	Curbed, Rt. Des: 10 ft; Min 2 ft Curbed, Lt. Des: 4 ft; Min 2 ft Uncurbed, Rt.: 10 ft; Lt.: 4 ft	Curbed, Rt. Des: 8 ft; Min 2 ft Curbed, Lt. Des: 4 ft; Min 2 ft Uncurbed, Rt.: 8 ft; Lt.: 4 ft	Right: 6 ft; Left: 4 ft
		Typical Surface Type (4)		Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
	Cross Slope	*Travel Lane (7)		45-1.01	2%	2%	2%
		Shoulder (7A)		45-1.02	Paved Width ≤ 4 ft: 2%; Paved Width > 4 ft: 4%	Paved Width ≤ 4 ft: 2%; Paved Width > 4 ft: 4%	Paved Width ≤ 4 ft: 2%; Paved Width > 4 ft: 4%
	Auxiliary Lane	Lane Width		45-1.03	Des: 12 ft; Min: 11 ft	Des: 12 ft; Min: 11 ft	Des: 12 ft; Min: 10 ft
		Curb Offset (8)			1 ft	1 ft	1 ft
		Shoulder Width			Des: 10 ft; Min: 2 ft	Des: 8 ft; Min: 2 ft	Des: 6 ft; Min: 2 ft
		Typical Surface Type (4)		Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
	TWLTL Lane Width			46-5.0	Des: 16 ft; Min. 14 ft	Des: 16 ft; Min: 14 ft	Des: 14 ft; Min: 12 ft
	Parking Lane Width			45-1.04	N/A	Des: 12 ft; Min: 10 ft (9)	Des: 12 ft; Min: 10 ft (9)
	Median Width	Depressed		45-2.0	26.5 ft – 50 ft	N/A	N/A
		Raised Island			Des: 18 ft; Min: 13 ft (10)	Des: 18 ft; Min: 4 ft (10)	Des: 18 ft; Min: 4 ft (10)
		Flush / Corrugated			Des: 16 ft; Min: 13 ft (10)	Des: 16 ft; Min: 4 ft (10)	Des: 16 ft; Min: 4 ft (10)
	Sidewalk Width (11)			45-1.06	5 ft with 5-ft Buffer (Des)	5 ft with 5-ft Buffer (Des)	Varies; 6 ft Min
	Bicycle-Lane Width (12)			51-7.0	Curbed: 5 ft Uncurbed: Shld Width +4 ft	Curbed: 5 ft Uncurbed: Shoulder Width +4 ft	Curbed: 5 ft
	Clear Zone			49-2.0	(13)	(13)	(13)
	Typical Curbing Type (where used) (14)			45-1.05	Sloping / Vertical	Sloping / Vertical	Sloping / Vertical
	Side Slopes (Uncurbed) (15)	Cut	Foreslope	45-3.0	6:1 (16)	6:1 (16)	N/A
			Ditch Width		4 ft (17)	4 ft (17)	N/A
			Backslope		4:1 for 20 ft; 3:1 Max. to Top (18)	4:1 for 20 ft; 3:1 Max. to Top (18)	N/A
		Fill			6:1 to Clear Zone; 3:1 Max. to Toe	6:1 to Clear Zone; 3:1 Max. to Toe	N/A
	Side Slopes (Curbed)	Cut (Backslope)		45-3.0	(19)	(19)	(19)
		Fill			12:1 for 12 ft; 3:1 Max. to Toe	12:1 for 12 ft; 3:1 Max. to Toe	12:1 for 12 ft; 3:1 Max. to Toe
	Median Slopes (Depressed)			45-2.0	Des: 8:1; Max: 5:1	N/A	N/A

* Controlling design criterion. Des: Desirable. Min: Minimum.

GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, 4 OR MORE LANES
(New Construction or Reconstruction)

Figure 53-6

Design Element			Manual Section	Design Value (By Type of Area)				
				Suburban	Intermediate	Built-Up		
Bridges	New or Reconstructed Bridge	*Structural Capacity (20)	Ch. 60	HL-93	HL-93	HL-93		
		*Clear-Roadway Width(21)	45-4.01	Uncurbed: Full Paved Approach Width Curbed: Full Approach Curb-to-Curb Width				
	Existing Bridge to Remain in Place	*Structural Capacity	Ch. 72	HS-20	HS-20	HS-20		
		*Clear-Roadway Width	45-4.01	Uncurbed: Travelway Plus 2 ft on Each Side; Curbed: Full Approach Curb-to-Curb Width				
	*Vertical Clearance (Arterial Under) (22)	New or Replaced Overpassing Bridge (22a)	44-4.0	16.5 ft	16.5 ft (22b)	16.5 ft (22b)		
		Existing Overpassing Bridge		14 ft	14 ft	14 ft		
		Sign Truss / Pedestrian Bridge (22a)		New: 17.5 ft; Existing: 17 ft	New: 17.5ft; Existing: 17 ft	New: 17.5 ft; Existing: 17 ft		
	Vertical Clearance (Arterial over Railroad) (23)		Ch. 69	23 ft				
Alignment Elements	Design Speed			30 mph	35 mph	45 mph	50 mph	55 mph
	*Stopping Sight Distance		42-1.0	200 ft	250 ft	360 ft	425 ft	495 ft
	Decision Sight Distance	Speed / Path / Direction Change	42-2.0	U: 620 ft SU: 535 ft	U: 720 ft SU: 625 ft	U: 930 ft SU: 800 ft	U: 1030 ft SU: 890 ft	U: 1135 ft SU: 980 ft
		Stop Maneuver		490 ft	590 ft	800 ft	910 ft	1030 ft
	Intersection Sight Distance, -3% to +3% (28)		46-10.0	P: 355 ft SUT: 450 ft	P: 415 ft SUT: 525 ft	P: 530 ft SUT: 675 ft	P: 665 ft SUT: 825 ft	P: 770 ft SUT: 950 ft
	*Minimum Radius for e_{max} =4% / 6%		43-2.0	260 ft/ 240 ft (24a)	420ft / 390 ft (24a)	600 ft / 550 ft (24a)	750 ft (24b)	1000 ft (24b)
	*Superelevation Rate (25)		43-3.0	Up to e_{max} = 6%			e_{max}=8%	
	*Horizontal Sight Distance		43-4.0	(26)				
	*Vertical Curvature (K-value)	Crest	44-3.0	19	29	61	84	114
		Sag		37	49	79	96	115
	*Maximum Grade (27)	Level	44-1.02	8%	7%	6.5%	6%	5.5%
		Rolling		9%	8%	7.5%	7%	6.5%
	Minimum Grade		44-1.03	Desirable: 0.5% Minimum: 0.3% (Curbed); 0.0% (Uncurbed)				

U: Urban; SU: Suburban.

* Controlling design criterion. A deviation from such is a design exception, and is subject to approval. See Section 40-8.0.

These criteria apply to a route either on or off the National Highway System, regardless of funding source.

GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, 4 OR MORE LANES
(New Construction or Reconstruction)

Figure 53-6 (Continued)

GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, 4 OR MORE LANES
(New Construction or Reconstruction)

Footnotes to Figure 53-6

(1) Design Speed. The minimum design speed should equal the minimum value, the anticipated posted speed limit after construction, or the legal speed limit on a non-posted highway. The legal speed limit in an urban district is 30 mph. Based on an engineering study, the design speed may be raised to an absolute maximum of 55 mph.

(2) On-Street Parking. In general, on-street parking is discouraged.

(3) Travel-Lane Width. For an arterial on the National Truck Network, the right lane must be 12 ft in width.

(4) Surface Type. The pavement-type selection will be determined by the INDOT Office of Pavement Engineering.

(5) Curb Offset. The curb offset (for both left and right sides) should be 2 ft. Vertical curbs introduced intermittently should be offset 2 ft. A continuous curb used along a median or channelizing island may be offset 1 ft.

(6) Shoulder Width. The value applies to the paved-shoulder width. The following will also apply.
- a. For an uncurbed section, the shoulder is paved to the front face of guardrail. The desirable guardrail offset is 2 ft from the effective usable-shoulder width. See Section 49-5.0 for more information.
- b. For an uncurbed section, a desirable additional 1 ft of compacted aggregate will be provided.
- c. For a curbed section, the curb offset is included in the paved shoulder width.

(7) Cross Slope (Travel Lane). Cross slopes of 1.5% are acceptable for an existing bridge to remain in place.

(7A) Cross Slope (Shoulder). See Figure 45-1A(1) or Figure 45-1A(2) for more-specific information.

(8) Curb Offset for Auxiliary Lane. In a curbed section, the offset may be zero.

(9) Parking Lane. Where a parking lane will be used as a travel lane during peak hours or may be converted to a travel lane in the future, the width should be equal to the travel lane width plus a 1-ft offset to the curb (if present). The cross slope for a parking lane is typically 1% steeper than that of the adjacent travel lane.

(10) Minimum Median Width. The criteria assume the presence of a mountable curb with a 0-ft curb offset.

(11) Sidewalk Width. A buffer of less than 2 ft wide is not permitted. If no buffer is provided, the sidewalk width should be 6 ft.

(12) Bicycle-Lane Width. The value is in addition to the width of a parking lane, if present. See Section 51-7.0 for additional details.

(13) Clear Zone. The following will apply.
- a. Facility with Vertical Curbs. The clear zone will be measured from the edge of travel lane or will be to the right-of-way line, whichever is less. No clear zone is required where there is 24-h parking.
- b. Facility with Sloping Curbs or without Curbs. The clear zone will vary according to design speed, traffic volume, side slopes, and horizontal curvature.
- c. Curbed Facility. There should be an appurtenance-free area as measured from the gutter line of any curb.
- d. Value. See Section 49-2.0 for specific clear-zone value.

Footnotes to Figure 53-6 (continued)

(14) Curbing Type. Vertical curbs may only be used with design speed 45 mph or lower.

(15) Side Slope (Uncurbed). Value is for new construction. See Sections 45-3.0 and 45-8.0 for more information. For a reconstruction project, see Section 49-3.0.

(16) Foreslope. See Sections 49-2.0 and 49-3.0 for the lateral extent of the foreslope in a ditch section.

(17) Ditch Width. A V-ditch should be used in a rock cut. See Section 45-8.0.

(18) Backslope. The backslope for a rock cut will vary according to the height of the cut and the geotechnical requirements. See Section 45-8.0 for typical rock-cut sections.

(19) Side Slope (Curbed) Cut. A shelf or sidewalk will be present immediately behind the curb before the toe of the backslope. The minimum width of a shelf will be 6 ft. Where a sidewalk is present, the toe of the backslope will be 1 ft beyond the edge of sidewalk. See Section 45-3.0 for more information.

(20) Structural Capacity (New or Reconstructed Bridge). The following will apply.
- a. HS-25 loading with Alternate Military Loading should be applied for each project with notice to proceed with design beginning September 1, 2004, through December 31, 2005.
- b A State-highway bridge within 15 mi of a Toll-Road gate must be designed for Toll-Road loading.
- c. A bridge on an Extra-Heavy-Duty Highway must be designed for the Michigan Train truck loading configuration.
- d. See Chapter Sixty for additional information on the loading configurations.

(21) Width (New or Reconstructed Bridge). See Section 59-1.0 for more information on bridge width.

(22) Vertical Clearance (Arterial Under Railroad). The following will apply.
- a. Value includes an additional 6-in. allowance for future pavement overlays.
- b. In a highly urbanized area, a minimum clearance of 14 ft may be provided if there is at least one route with a 16-ft clearance.
- c. Vertical clearance applies from usable edge to usable edge of shoulders.

(23) Vertical Clearance (Arterial Over Railroad). See Chapter Sixty-nine for additional information on railroad clearance under a highway.

(24) Minimum Radius. The following will apply:
- a. Based on e_{max} = 4% or 6% and low-speed urban street conditions.
- b. Based on e_{max} = 8% and open-road conditions.

(25) Superelevation Rate. See Section 43-3.0 for values of superelevation rate based on design speed and radius. See Section 43-3.0 and the INDOT *Standard Drawings* for information on superelevation requirements.

(26) Horizontal Sight Distance. For a given design speed, the necessary middle ordinate will be determined by the radius and the sight distance which applies at the site. Sometimes the stopping-sight-distance value for a truck will apply. See the discussion in Section 43-4.0.

(27) Where adjacent sidewalks are present, the maximum desirable grade is 5%.

(28) Intersection Sight Distance. For a left turn onto a two-way, 4-lane undivided roadway: P = Passenger car; SUT = single unit truck. See Figure 46-10G for value for a combination truck.